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(54) Abstract Title

Adjustable tubular frame structure

(57) The present invention is adapted for use in the infant stroller, the baby bedrail or other infant utensils formed by the tubular frames, wherein the tubular frame structure comprises an inner tube member (1) and an outer tube member (2). A pressed member (31) disposed at one end of the outer tube member (2) can be held at an expanded position by an exertion force or at a releasing position due to the relief of that force.

As shown a pivoted handle (321) acts to draw the member (31) against a portion (11) which causes it to expand against the outer tube member.

In another embodiment the handle acts to draw a component towards an expanding member located on the inner tube.

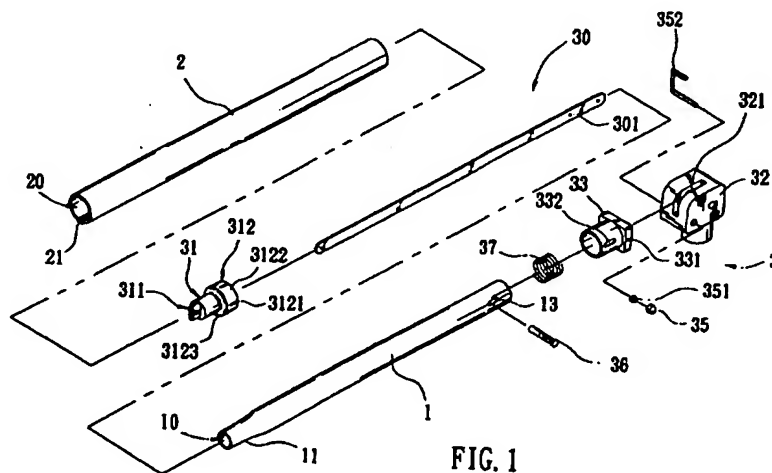


FIG. 1

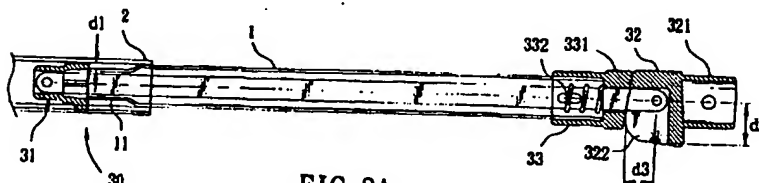


FIG. 3A

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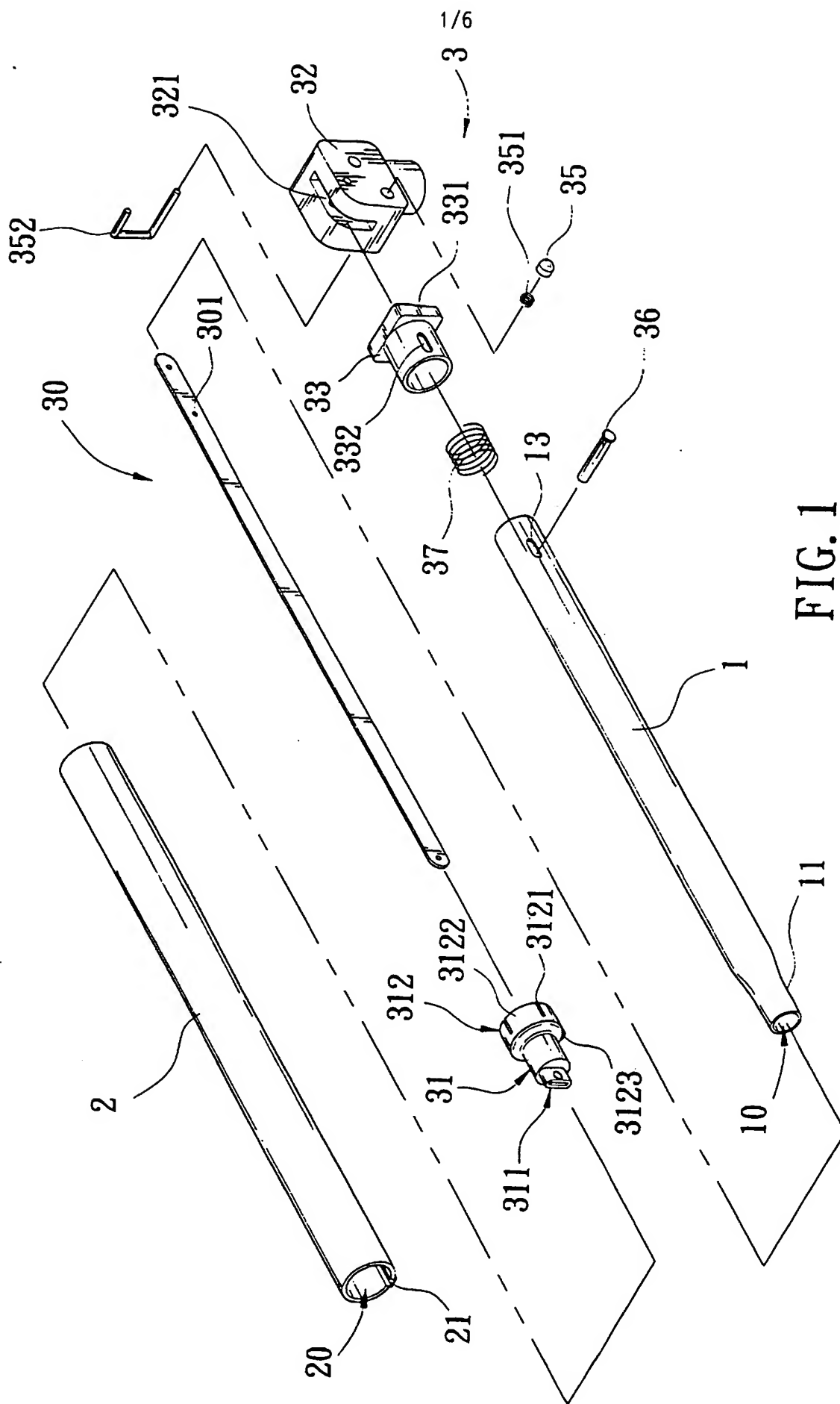


FIG. 1

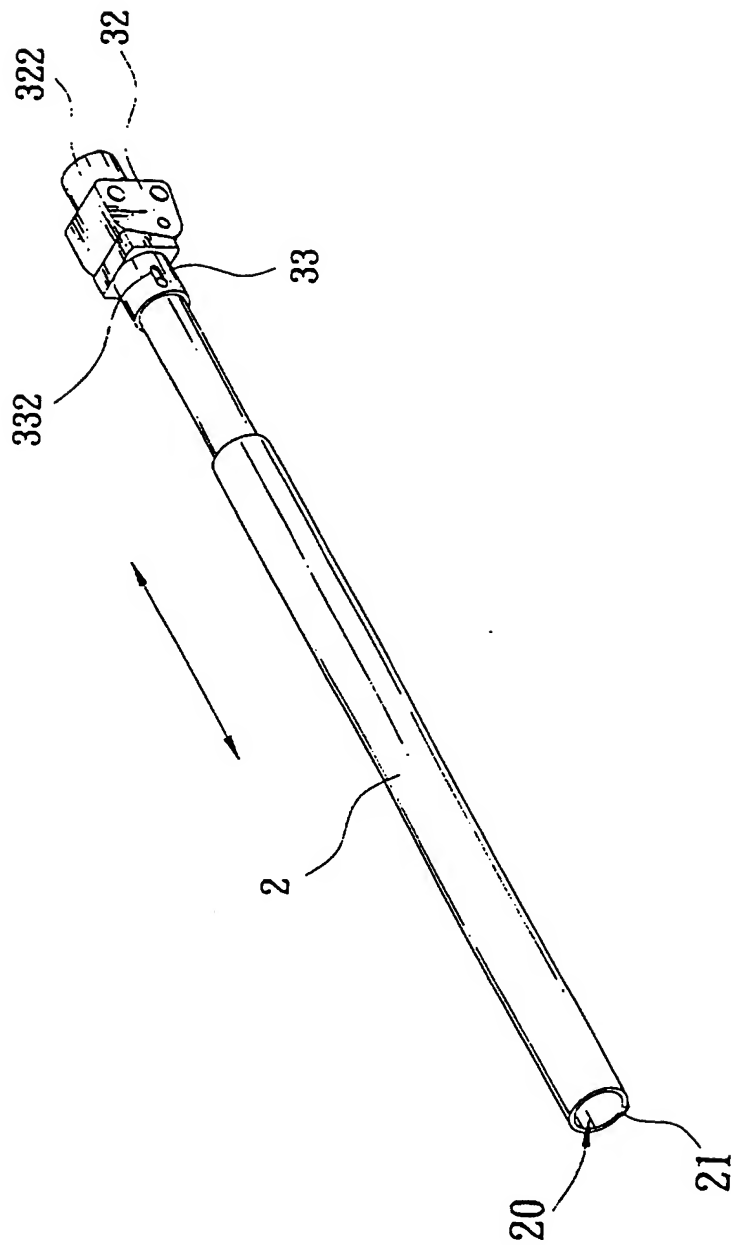


FIG. 2

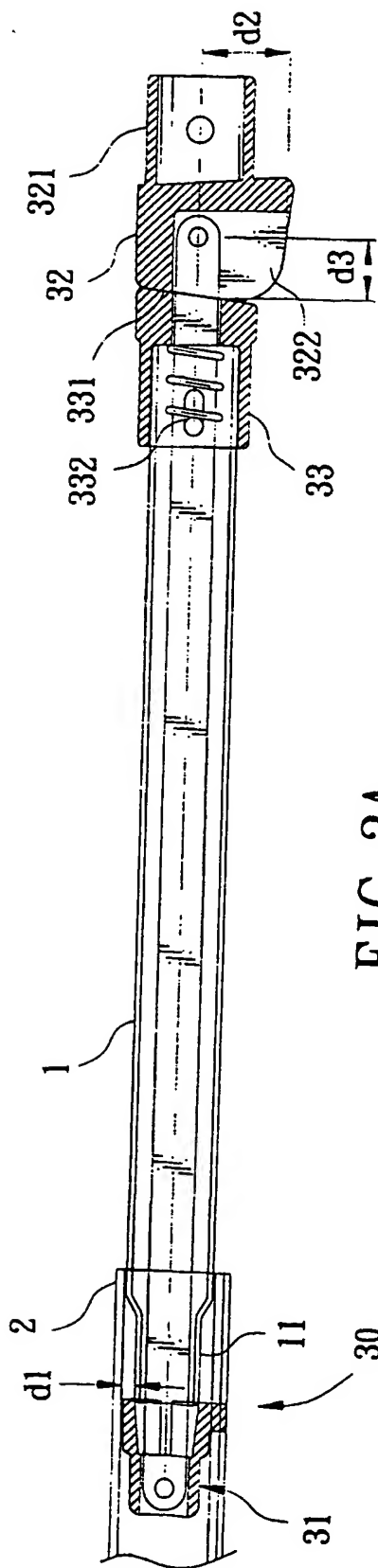


FIG. 3A

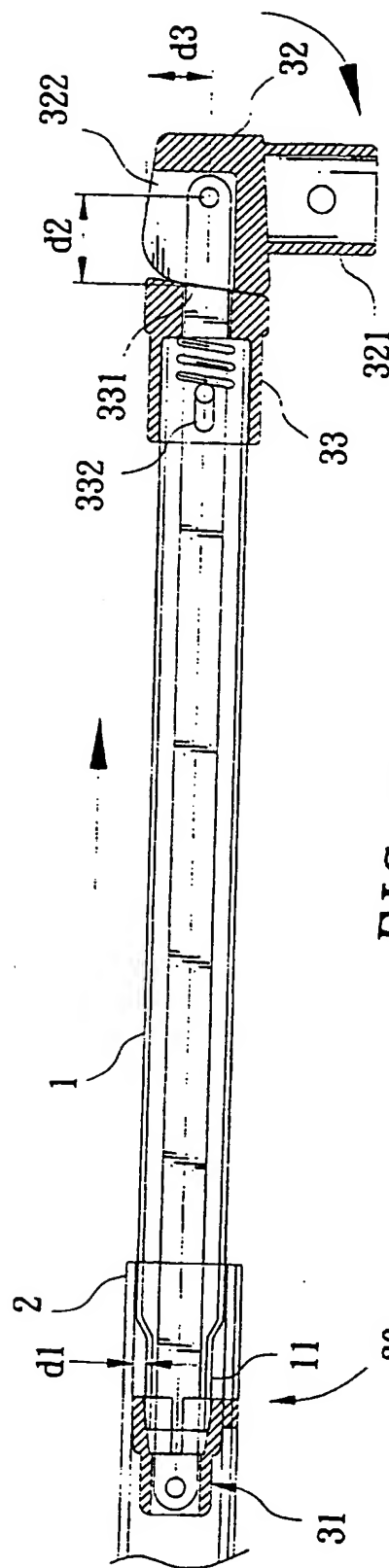


FIG. 3B

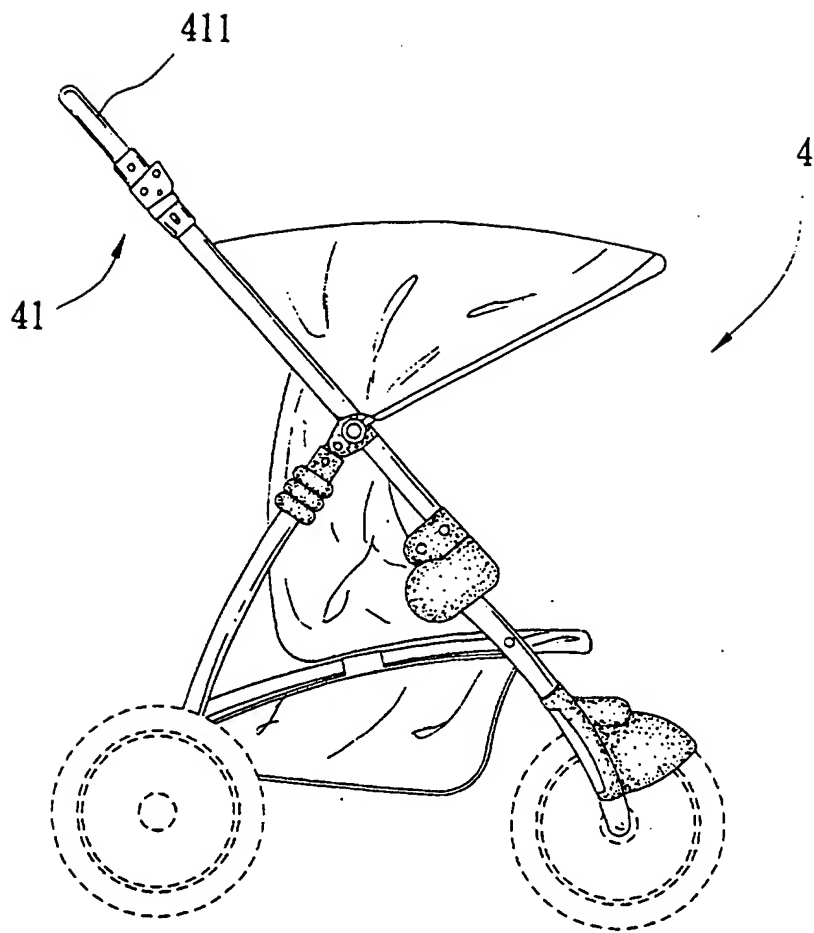


FIG. 4A

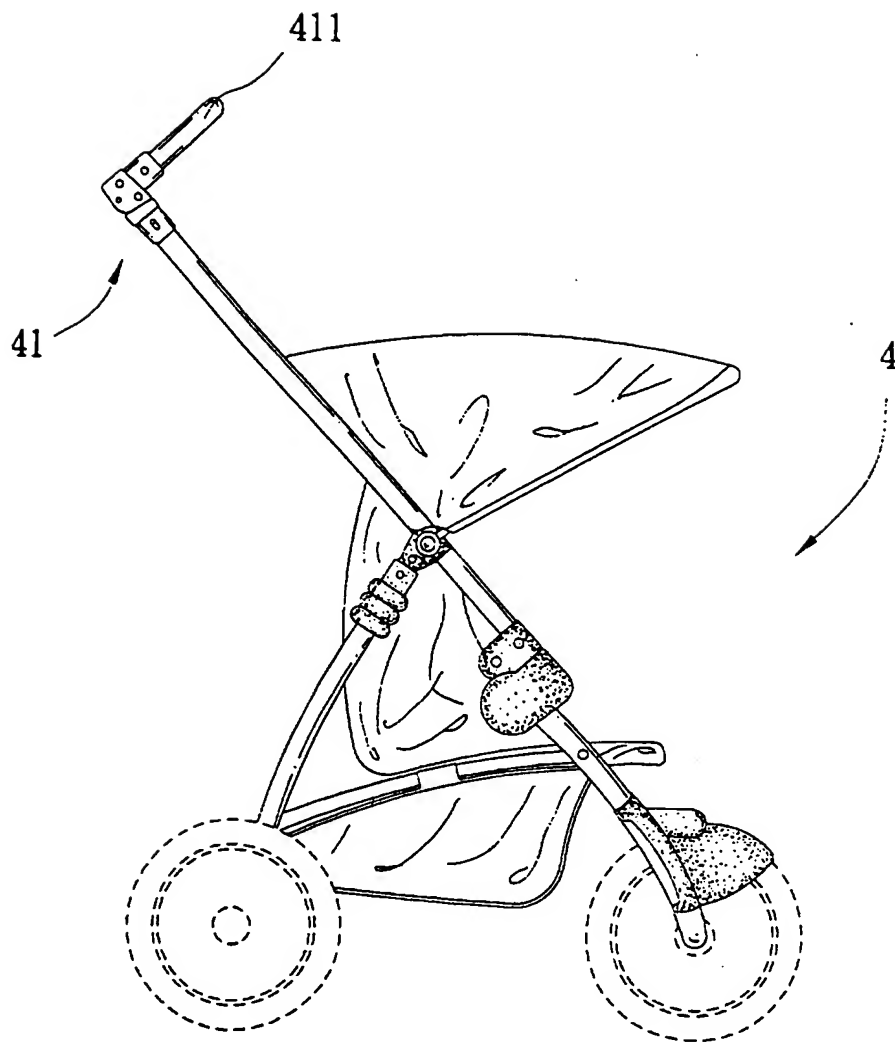


FIG. 4B

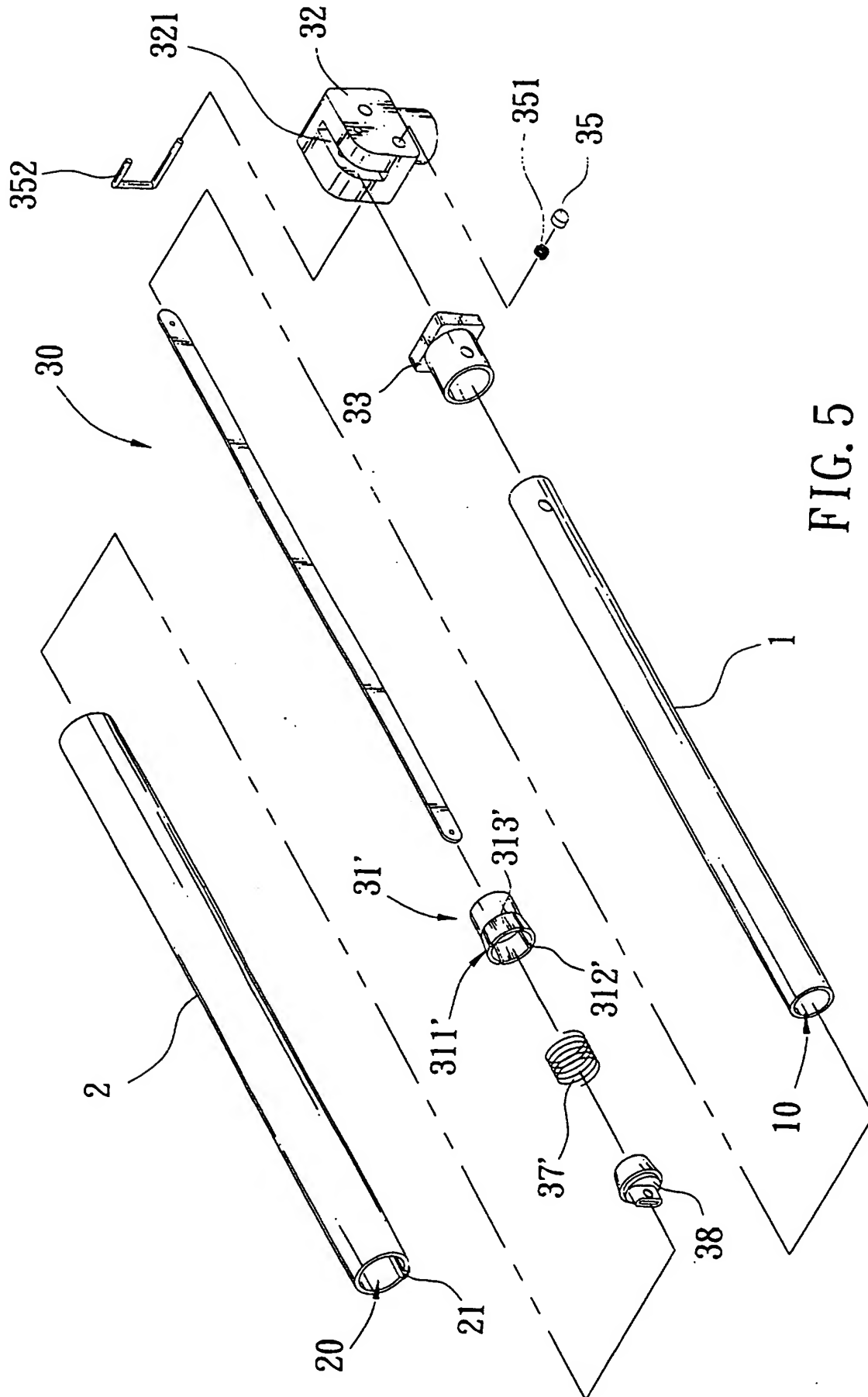


FIG. 5

TUBULAR FRAME STRUCTURE ADAPTED FOR INFANT UTENSILS

The present invention relates to a tubular frame structure adapted for infants' utensils, especially to a tubular frame structure with an adjustable length to be freely expanded, contracted or fixed.

There are various kinds of infant utensils as known to the art, such as the infant stroller provided for parent taking their children outside, the bedrail of child bed for avoiding the fall of infants therefrom, and the safety door disposed between the gates to prevent infants from creeping out of the room. Such kind of the infant utensils usually consist of several tubular frames, but their forms of usage cannot be freely customized according to the practical need due to the fixed lengths of such tubular frames that are rigidly assembled to conform to only one type. For example, the frame structure of the infant stroller usually consists of a plurality of tubular frames with fixed lengths. Its handle also consists of one (or more) tubular frame with fixed length. The applicability thereof to all users can be therefore a doubt because the handle size can never be suitable for every user due to the inflexible length thereof.

The applicability problem caused by the fixed length of the tubular frame is substantially resolved in many products such as the contractible handle of a portable luggage hold or a contractible clothespole. For a portable luggage hold, a fixed handle length cannot be suitable for all users, but with a contractible handle this kind of problem can be resolved. Generally, a contractible handle comprises an inner tube and an outer tube, wherein the inner tube can be freely displaced inside the outer tube. A tooth-like or

aperture-like location-fixing portion is disposed on the inner tube, and a location-fixing member to be fitted to the location-fixing portion is disposed on the outer tube. The inner tube can be freely moved by releasing the location-fixing member on the outer tube, otherwise the inner and the outer tubes can be fixed while the location-fixing member is fitted into one of the location-fixing portion. By that a contractible tube body with adjustment of multiple steps is provided and then applied to the handle of an infant stroller. Furthermore, a contractible clothespole also comprises an inner tube and an outer tube, wherein the inner tube can be freely displaced inside the outer tube and an eccentric cam is provided at the end of the outer tube into which the inner tube extends. The eccentric cam can be expanded to tightly contact the inner wall of the outer tube by screwing the outer tube to fix the inner tube and the outer tube, and therefore a contractible tubular frame structure with a stepless adjustment of length is thereby provided.

However, the constituent tubular frame in the frame structure is not usually a single member in most of the infant utensils, whereby the displacement of one tubular frame will have an influence on the interaction with other tubular frames connected thereto. The adjustment of multiple steps is therefore adopted in the handle of an infant stroller to adjust the length of tubular frame. Such adjustment is limited by the sectional nature of the location-fixing portion, which cannot be suitable for every user, and the adjustment procedure is also too complicated. The stepless adjustment by screwing the eccentric cam to contract and extend the tubular frame will change the relative location of other tubular frame connected thereto in the mean time when the tubular frame is revolved. For example, it is uncertain that the handle of the infant stroller will return to the position convenient for holding after being adjusted. Under such situation, the handle is not suitable for being

connected to other tubular frames in the infant utensils.

The primary object of the present invention is to provide a stepless contractible tubular frame structure applicable to the infant utensils.

According to the art as disclosed in the present invention, the tubular frame structure comprises primarily an inner tube member, an outer tube member, and a pressed member, wherein the inner tube member is disposed inside the outer tube member and the pressed member can be changed to an expanded position or a releasing position. When the pressed member is disposed at the expanded position, the inner tube member is forced to stay at a fixed position in the outer tube member; while the pressed member is disposed at the releasing position, the inner tube member is freely displaced inside the outer tube member to achieve the stepless adjustment in the length of the tubular frame.

For the full and easy comprehension of the characteristics and merits proposed by the aforesaid and other objects, it will be further described by preferred embodiments of the present invention accompanied by the illustrated drawings.

FIG. 1 is an exploded illustration for the structure according to the present invention;

FIG. 2 is a structural illustration according to the present invention;

FIG. 3A is a cross-sectional view of the present invention in motion;

FIG. 3B is another cross-sectional view of the present invention in motion;

FIG. 4A is an application instance according to the present invention;

FIG. 4B is another application instance according to the present invention;

FIG. 5 is a preferred embodiment according to the present invention.

Referring now to FIG. 1 and FIG. 2, the tubular frame structure applicable to the infant utensils according to the present invention comprises an inner tube member 1, an outer tube member 2, and a pressing mechanism 3.

The inner tube member 1 is a hollow tube body and comprises therein an accommodation space 10 with two open ends, wherein one end of the inner tube member 1 is tapered to form a pressing portion 11.

The outer tube member 2 is a hollow tube body and comprises therein an accommodation space 20 with at least one open end, wherein an axial track 21 is disposed on the inner wall of the out tube member 2.

The outer diameter of the inner tube member 1 is slightly smaller than the inner diameter of the outer tube member 2. The pressing portion 11 of the inner tube member 1 extends into the outer tube member 2, by which the inner tube member 1 can be freely displaced inside the outer tube member 2 along the axial direction thereof to change the relative position between the two tube members and therefore the length of the tube structure is changed in a contractible way. Additionally, there is a clearance d1 between the pressing portion 11 of the inner tube member 1 and the outer tube member 2.

The pressing mechanism 3 comprises a link 30, a pressing member 31, and a controlling member 32. The length of the link 30 is slightly longer than that of the inner

tube member 1 and disposed inside the accommodation space 10 therein, and the link 30 can be a shaft or a flexible wire. The pressing member 31 is disposed at the end of the link 30 opposite to the pressing portion 11 of the inner tube member 1. The pressing member 31 is in a cylindrical shape and made of the flexible material with elasticity such as the plastic, rubber, or the like. The pressing member 31 further comprises a compressible second end 312 and a first end 311 connected to the link 30. The second end 312 comprises a plurality of gaps 3121, a plurality of pressing chip 3122 defined by the portion formed by the two adjacent gaps 3121, and a plurality of rib 3123 opposite to the track 21. The diameter of the pressing member 31 is slightly smaller than the inner diameter of the outer tube member 2 and the pressing member 31 is normally kept in a releasing position on the outer end of the pressing portion 11. The other end of the link 30 is pivoted to the controlling member 32, wherein a holding post 33 is disposed at the open end of the inner tube member 1 opposite to the controlling member 32 and the holding post 33 comprises a holding surface 331 perpendicular to the axis of the controlling member 32. The controlling member 32 is held against the holding surface 331 of the holding post 33 and further comprises a long slot 321 opened toward two surfaces, by which the controlling member 32 can make a 90 degree of rotation and is normally in alignment with the axis of the inner tube member 1. The controlling member 32 can make a 90 degree of rotation under the exertion force, which forces the controlling member 32 to be in a different plane from the inner tube member 1 (in the perpendicular position). In the mean while, the controlling member 32 can drive the link 30 to move in a straight line along the axis and the link 30 will pull the pressing member 31 to move toward the pressing portion 11. Therefore, the pressing member 31 is forced to be gradually close to the pressing portion

11 and expand outward to touch the inner wall of the outer tube member 2. In order that the link 30 can be driven by the rotation of the controlling member 32 to make displacement in a straight line along the axis thereof, the radial distance d_2 measured from the pivoted position of the controlling member 32 to the link 30 to the open end of the long slot is longer than the axial one d_3 measured from the same. By that, the link 30 can be pulled to displace due to the aforesaid distance difference by the rotation of the controlling member 32. Moreover, the portion of the controlling member 32 disposed at the outer edge of the long slot is in an arched shape for the controlling member 32 to rotate a right angle smoothly around the holding post 33. Additionally, the controlling member 32 still further comprises a blocking button 35, a spring 351, and a U-shaped link 352. In the normal state when the controlling member 32 is in alignment with the axis of the inner tube member 1, the U-shaped link 352 can be driven out of the link 30 by the spring 351 to contact against the bottom of the link 30. The controlling member 32 can be rotational when the U-shaped link 352 is released from the link 30 by pressing the blocking button 35. When the controlling member 32 is moved to a vertical position, the U-shaped link 352 is pulled by the spring 351 to move to the upper of the link 30 and by which the controlling member 32 is kept at a vertical position. By then, it is necessary to press the blocking button 35 again to force the controlling member 32 to re-align with the axis of the inner tube member 1. Additionally, the controlling member 32 further comprises a connection portion 322 to be interconnected to other tubular frames.

Moreover, two guide slots 332 and 13 opposite to each other are respectively disposed at the holding post 33 and the inner tube member 1. The link 30 also comprises a through hole 301 located opposite to the positions of the two guide slots 332 and 13, and a shaft 36

passing through the holding post 33, the inner tube member 1, and the link 30 and disposed upon the two guide slots 332 and 13. Therefore, the movement of the link 30 can be led by the two slots. A spring 37 for pushing and holding the shaft 36 is installed inside the inner tube member 1 to keep the pressing member 31 normally stay at the outer edge of the pressing portion 11 (the releasing position) , which makes the inner tube member 1 move freely inside the outer tube member 2. When rotating and then driving the link 30 to move, the controlling member 32 can hold against the force exerted by the spring 37 to drive the pressing member 31 to move to the pressed position.

As referred to the FIG. 3A and 3B, the link 30 of the pressing mechanism 3 held by the spring 37 to force the pressing member 31 to stay at the outer edge of the pressing member 31 of the inner tube member 1 under the normal condition. The pressing member 31 is kept at the releasing position and by which the inner tube member 1 can freely move inside the outer tube member 2 to change the relative position between the two tube members. When moving to a desired position, the inner tube member 1 can be kept fixed at this desired position by rotating the controlling member 31 to 90 degree to drive the link 30 to move axially and force the pressing member 31 to move toward the pressing portion 11 and then be gradually expanded to contact against the inner wall of the outer tube member 2.

A preferred embodiment adapted to use in an infant stroller according to the present invention is as referred to the FIG. 4A, 4B and 4C. The infant stroller 4 comprises a using position for seating the infant and being pulled by the user and a collapsible folded position, wherein the art as disclosed according to the present invention can be applied to the design of the handle 41 as shown in the figures. The outer tube member 2 in the present invention

can be installed on the stroller frame and the inner tube member 1 can be freely displaced in the upward direction. A hold handle 411 is installed on a connection portion 332 of the controlling member 32. When the infant stroller 4 is in a folded state, the inner tube member 1 can be contracted into the outer tube member 2; and when the infant stroller 4 is in use, the inner tube member 1 can be pulled out of the outer tube member 2 to adjust the length thereof according to the user's need and then the inner tube member 1 can be fixed to the desired position by rotating the hold handle 411 for 90 degree. Additionally, the hold handle 411 is just suitable for the user to hold after the rotation thereof.

There is still another embodiment for the pressing mechanism 3 as referred to the FIG.5. For the inner tube member 1 to be displaced to a desired position and fixed still relative to the outer tube member 2, the pressing mechanism 3 comprises a pressing member 31' disposed at the end where the pressing mechanism 3 enter the inner tube member 1. The pressing member 31' comprises a cylindrical-shaped pressing end 311' with a plurality of cutting gaps 312' around the periphery thereof, and a plurality of pressing plates 313' defined by the area delimited by the two adjacent cutting gaps 312'. The pressing member 31' owns the same diameter with that of the inner tube member 1 under the normal condition and therefore will not impede the axial movement of the inner tube member 1 inside the outer tube member 2. However, the pressing member 31' can be under an exertion force directed from the inside to the outside to force the pressing plates 313' to expand outward. When the pressing plates 313' are expanded to contact against the inner wall of the outer tube member 2, the inner tube member 1 will be fixed still inside the outer tube member 2 by the friction force exerted from the pressing plates 313' and the exertion force mentioned above. And the pressing plates 313' can bounce to the normal

position due to the resilience after the relief of the exertion force. Moreover, the controlling member 32 is rotated to drive the link 30 to move in an axial direction, wherein a pressing post 38 is installed on the location of the link 30 opposite to the pressing member 31' and a spring 37' is held against the inner tube member 1 to keep the pressing post 38 normally in a releasing state where the pressing post 38 is not pressed by the pressing post 38. And the pressing post 38 can also be driven by the movement of the link 30 to be pressed to a expanded position.

The tubular frame structure for the infant utensils according to the present invention comprises the following merits:

1. It can be applied to the infant utensils consisting mainly of the tubular frames.
2. The length thereof can be steplessly adjusted dependent on the place or the user's need.

Although the invention has been described in terms of specific preferred embodiments, it will be obvious to one skilled in the art that various modifications and substitutions are contemplated by the invention disclosed herein and that all such modifications and substitutions are included within the scope of the invention as defined in the appended claims.

CLAIMS

1. A tubular frame structure adapted for infants' utensils, comprising :

an outer tube member (2) which includes an accommodation space (20) with at least one open end,

an inner tube member (1) which includes an accommodation space (10) with at least two open ends, entering the outer tube member (2) from the open end thereof and axially movable inside the outer tube member (2), and

a pressing member (31) which includes a first end (311) and a second end (312) and is movable inside the outer tube member (2), characterized by the second end (312) which can be pressed to contract or expand and by which the pressing member (31) can be positioned between a freely movable releasing position and a fixed position pressing against the outer tube member (2).

2. A tubular frame structure according to claim 1, characterized by the inner tube member (1) comprising a pressing portion (11) having a smaller diameter than that of the inner tube member (1).

3. A tubular frame structure according to claim 1, characterized by the first end being connected with a link (30) disposed inside the inner tube member (1) and the link (30) being connected at the other end with a controlling member (32) which can rotate to drive the link (30) to move axially to force the pressing member (31) to move from the releasing position away from the pressing portion (11) to the pressing position of entering the

pressing portion (11).

4. A tubular frame structure according to claim 1, characterized by the pressing member (31) being made of the flexible material with elasticity.
5. A tubular frame structure according to claim 3, characterized by the link (30) being a flexible wire.
6. A tubular frame structure according to claim 1, characterized by the pressing member (31) comprising a plurality cutting gaps (3121) around the periphery thereof, and a plurality of pressing plates (3122) defined by the area delimited by the two adjacent cutting gaps (3121) to be expanded outward.
7. A tubular frame structure according to claim 1, characterized by the inner tube member (1) comprising a blocking post (33) at a location opposite to the controlling member (32) and the blocking post (33) comprising a guide slot (332).
8. A tubular frame structure according to claim 7, characterized by the guide slot (332) of the blocking post (33) and the link (30) being past through by a shaft (36).
9. A tubular frame structure according to claim 8, characterized by the shaft (36) being installed with a spring (37) to keep the pressing member (31) normally in the releasing position.
10. A tubular frame structure according to claim 3, characterized by the controlling member (32) comprising a long slot (321) opened at two surfaces.
11. A tubular frame structure according to claim 10, characterized by the outer

edge of the long slot (321) in the controlling member (32) being in a shape of arched surface.

12. A tubular frame structure according to claim 1, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of Figs. 1 to 5 of the accompanying drawings.

13. A tubular frame structure adapted for infants' utensils, comprising:

an outer tube member (2) comprising an accommodation space (20) with at least one open end;

an inner tube member (1) comprising an accommodation space (10) with at least two open ends, entering the outer tube member (2) from the open end thereof and axially movable inside the outer tube member (2);

a pressing member (31) comprising a first end (311) and a second end (312) and movable inside the outer tube member (2), wherein the second end (312) can be pressed to contract or expand and by which the pressing member (31) can be positioned between a freely movable releasing position and a fixed position pressing against the outer tube member (2);

a link (30) disposed inside the inner tube member (1) and connected with the first end (311) of the pressing member (31);

a controlling member (32) disposed at one end of the inner tube member (1) and pivoted to the other end of the link (30), wherein the controlling member (32) can drive the

link (30) to move axially to force the pressing member (31) to move from the releasing position away from the pressing portion (11) to the pressing position of entering the pressing portion (11).

14. A tubular frame structure according to claim 13, characterized by the pressing member (31) being made of the flexible material with elasticity.

15. A tubular frame structure according to claim 13, characterized by the link (30) being a flexible wire.

16. A tubular frame structure according to claim 13, characterized by the link (30) being installed with a spring (37) to keep the pressing member (31) normally in the releasing position.

17. A tubular frame structure according to claim 13, characterized by the pressing member (31) comprising a plurality cutting gaps (3121) around the periphery thereof, and a plurality of pressing plates (3122) defined by the area delimited by the two adjacent cutting gaps (3122) to be expanded outward.

18. A tubular frame structure according to claim 13, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of Figs. 1 to 5 of the accompanying drawings.

19. A tubular frame structure adapted for infants' utensils, comprising:
an outer tube member (2) comprising an accommodation space (20) with at least one open end;

an inner tube member (1) comprising an accommodation space (10) with at least two open ends, entering the outer tube member (2) from the open end thereof and axially movable inside the outer tube member (2);

a pressing member (31') disposed at the end where the inner tube member (1) enter the outer tube member (2) and further comprises a pressing end (311') which can be pressed to contract or expand ; and

a pressing block (38) which can be away from the pressing end (311') of the pressing member (31') to lead the inner tube member (1) to a releasing position of free movement, or press the pressing end (311') to lead the inner tube member (1) to be fixed relative to the outer tube member (2) in a pressed position.

20. A tubular frame structure according to claim 19, characterized by the pressing block (38) being connected with a link (30) disposed inside the inner tube member (1) characterized by the link (30) being connected with a controlling member (32) at the other end thereof and characterized by the controlling member (32) which can rotate to drive the link (30) to move axially and thereby cause the pressing block (38) to move from the releasing position away from the pressing portion (11) to the pressing position of entering the pressing portion (11).

21. A tubular frame structure according to claim 19, characterized by the pressing block (38) being installed with a spring (37') pressing against the inner tube member (1) to keep the pressing block (38) normally in the releasing position.

22. A tubular frame structure according to claim 19, characterized by the pressing

block (38) being made of the flexible material with elasticity.

23. A tubular frame structure according to claim 19, characterized by the link (30) being a flexible wire.

24. A tubular frame structure according to claim 19, characterized by the pressing member (31') comprising a plurality cutting gaps (312') around the periphery thereof, and a plurality of pressing plates (313') defined by the area delimited by the two adjacent cutting gaps (312') to be expanded outward.

25. A tubular frame structure, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of Figs. 1 to 5 of the accompanying drawings.